Low prevalence of antibodies to bluetongue and epizootic hemorrhagic disease viruses in dogs from southern Georgia

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Bluetongue viruses (BTV) and epizootic hemorrhagic disease viruses (EHDV) are closely related orbivirus serogroups that infect both wild and domestic ruminants; both virus groups are vector-borne by Culicoides spp. Although it is generally thought that these viruses cause disease in artiodactyls only, abortion and death due to BTV serotype 11 infection was recently reported in domestic dogs following vaccination with a contaminated modified live combination canine vaccine. Dogs also are susceptible to African horse-sickness viruses (AHSV), another serogroup of orbiviruses.

Although a high prevalence of antibodies to EHDV and BTV occurs in white-tailed deer (WTD, Odocoileus virginianus) in the southeastern United States, especially in the coastal plain, little information is available regarding natural exposure of nonartiodactyls such as dogs. In such an area, dogs might be naturally exposed to these viruses, either by vector transmission or, as in the case of AHSV, through consumption of infected meat. The purpose of this study was to determine prevalence of antibodies to BTV and EHDV in dogs from the coastal plain of Georgia.

Dog serum samples used in this study were from a larger randomized sample that was collected at veterinary clinics throughout Georgia from April 1992 to March 1993. Randomization was accomplished by requesting the participating veterinarians to obtain a blood sample from the first 4 dogs that entered the clinic on alternate Mondays. All samples selected for this study were from dogs from the coastal plain of Georgia; efforts were made to select dogs that were primarily outside dwellers. The following information was recorded for most of the dogs sampled: county of residence, age, sex, breed, and number of hours inside and outside. All samples were stored at -80 C until testing.

Serum samples were tested for precipitating antibodies to BTV and/or EHDV serogroups using EHDV and BTV agar gel immunodiffusion (AGID) test kits as described by the manufacturer. In addition, serum neutralization tests against all endemic EHDV and BTV serotypes were done on all samples. Serum neutralizing tests were performed as previously described with the following modifications. Heat-inactivated serum samples were diluted (1:5) in minimum essential medium supplemented with 3% fetal bovine serum and antibiotics (100 units penicillin, 0.1 mg streptomycin, 0.25 µg amphotericin B/ml). For testing, 25 µl of the serum dilution was incubated (37 C) for 1 hour with 25 µl of BTV-2, -10, -11, -13, and -17 and EHDV-1 and EHDV-2 at 100-300 TCID₅₀/25 µl. After 1 hour, approximately 2.5 x 10⁴ baby hamster kidney cells (BHK21)/ml were added to each well. Plates were read at 48-72 hours. Serum dilutions exhibiting > 10% cytopathic effect were considered negative.

Sera from 130 dogs from the coastal plain of Georgia were tested. County of residence was known for 120 dogs (Fig. 1). Although 12 counties were represented, 82% of the dogs came from Thomas, Tift, Lowndes, Dougherty, and Ben Hill counties. Most of the dogs (119) were purebred (37 different breeds); 78 (65%) of these dogs were medium or large breeds. The most common breed was the Labrador Retriever (19% of all dogs). Ages ranged from 0.5 to 16 years (x = 3.9 years). There were 64 males, 17 neutered males, 19 females, and 29 neutered females; sex was not recorded for 1 dog. Eighty-eight dogs (68%) were described as spending ≥ 12 hours/day outside; 18 (14%) spent 4-12 hours/day outside; 24 (18%) spent < 4 hours/day outside.

Only 1 of the 130 serum samples had antibodies to either EHDV or BTV. This sample was positive for BTV precipitating antibodies by AGID and had serum neutralizing antibodies to BTV-11 at a titer of 1:40. The positive sample was collected from a 12.5-year-old neutered female Boxer-cross from Tift County on March 3, 1993. This dog was described as spending 24 hours/day outside.

The prevalence of antibodies to EHDV and BTV in dogs from coastal plain Georgia was very low (< 1%) as compared with 77% observed from WTD tested from this region from 1989 to 1991. The low prevalence of antibodies to BTV was not unexpected because serologic evidence of BTV in WTD in Georgia is low (< 2% of WTD tested during 1989-1991 were seropositive for BTV-11), and these viruses probably are not circulating in the WTD and Culicoides populations every year. This reasoning cannot be used to explain the absence of antibodies to EHDV in dogs. Results from WTD in Georgia from 1989 to 1991 indicate that exposure to EHDV, particularly EHDV-2, is very common in this area, with 85% of all AGID-positive samples testing positive to this serotype. Although vector transmission and ingestion of meat from infected animals are possible routes of BTV and EHDV infection in dogs, results from this study suggest that exposure in dogs is minimal. In this study, 82% of the dogs were described as spending ≥ 4 hours/day outside, and these dogs probably had potential for vector exposure. The specific Culicoides vectors for these viruses may not feed on dogs, either because of host preference by the insect or because the vector and dogs do not share similar habitats. Oral infection due to the consumption of infected carcasses, as described for AHSV, also may not occur, either because BTV and EHDV infection cannot be acquired orally or because infected carcasses are not readily available for consumption.

It is uncertain whether or not the dog positive for anti-
Although BTV can cause infection and disease in dogs, little is known about infection of dogs with the closely related EHDV. This study indicates that natural exposure to EHDV in an endemic area of Georgia is minimal.

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**Sources and manufacturers**

a. Veterinary Diagnostic Technology, Wheat Ridge, CO.

b. Sigma Chemical Co., St. Louis, MO.

c. National Veterinary Services Laboratory, Science and Technology, Animal and Plant Health Inspection Service, USDA, Ames, IA.

d. American Type Culture Collection, Rockville, MD.

**References**


